Human lead exposure and its associated adverse health consequences have long been recognized as posing major threats to occupational and public health. Remarkable progress has been made, especially since 1970, in addressing lead-related health issues through various governmental and nongovernmental actions world-wide. Of particular note is the tremendous success experienced in the United States concerning reductions in lead exposure of high-risk groups (e.g., occupationally exposed workers, young infants and children, pregnant women and other women of childbearing age, etc.). Such lead exposure reductions have been accomplished through improved industrial hygiene practices, phaseout of leaded gasoline, reduced use of lead pipes and/or lead solder in drinking water distribution and plumbing systems, discontinued use of lead-soldered containers for food preservation/distribution purposes, cleanup of contaminated soil around smelter and waste disposal sites, and myriad other actions undertaken during the past few decades. Despite this laudable progress made to date, much still needs to be done, however, regarding certain remaining sources and pathways of lead exposure that are estimated to affect millions of Americans. Much attention is now focused on scientific research, risk assessment, and policy development to address what probably constitutes the most extensive remaining lead-related public health issue in the United States—widespread exposures to lead-contaminated house dust and soils on private or public residential properties, derived from deteriorating paint used in or on houses and other residential structures, e.g., apartment complexes, public housing units, etc.

The modeling of relationships between multimedia lead exposures through a variety of pathways (e.g., air, water, dietary, and dust intake) and their respective impacts on blood lead distributions in one or more at-risk groups has provided (and continues to provide) important inputs to risk assessments and policy decisions aimed at characterizing and reducing significant sources of lead exposure worldwide. This *Environmental Health Perspectives (EHP)* monograph presents a series of papers, prepared by internationally recognized scientific experts and policy decision makers, that focus on diverse aspects of *a*) general concepts underlying development of models and their validation; *b*) biologic and other factors affecting exposure to lead and its uptake and biokinetic distribution/elimination; *c*) various approaches (especially current ones) to the modeling of lead exposure impacts on blood lead distributions and other indices of lead exposure; *d*) approaches to the verifying and validation of such lead models; and *e*) future directions for improving the scientific bases for lead models, further development and refinement of such models, and their verification and validation.

Growing controversy during the 1990s about the use of lead models to support regulatory decisions and/or issuance of guidance for remediation of paint, dust, and/or soil lead-contamination situations provided the impetus for the U.S. Environmental Protection Agency (U.S. EPA) to organize and convene a public workshop to provide a forum for open discussion and debate of the topics listed above (i.e., topics *a-d*). The Lead Model Validation Workshop, planned under the auspices of the U.S. EPA Technical Review Workgroup for Lead and coordinated by the U.S. EPA National Center for Environmental Assessment, Research Triangle Park Division (NCEA-RTP), was held 21–23 October 1996 in Chapel Hill, North Carolina. The workshop involved the oral presentation of papers and extensive discussion by invited participants and attendees that focused on the above-listed topics. Expanded, written versions of the papers presented (taking into account the workshop discussions and other information) compose the nucleus of materials in this monograph; and all the papers contained herein underwent independent peer review (and any consequent revision) in accordance with standard processes employed by *EHP*. As such, this monograph represents more than the proceedings of the Lead Validation Workshop, which served to stimulate preparation and editing of the monograph.

One key outcome of the workshop was the identification of future directions that could be taken to address the issue of lead model validation. General consensus was achieved on certain requirements for the model validation process. Validation is seen as steps or procedures that increase confidence in model output. The first step is to compare the various models (e.g. the U.S. EPA integrated exposure uptake biokinetic [IEUBK] model) with other lead models to determine if there are similarities or significant differences in their outputs. The second step is to follow a sequence of validation procedures that include verification model components to determine that the model equations have been properly characterized; verification of the computer code; determation of the operational reliability (same result from repeated runs by different users); sensitivity analyses (to establish consistency over a range of reasonable inputs); and empirical comparisons (compare model-predicted blood lead distributions to actual, measured distributions).

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